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PRIMARY PARTNER

Gas Technology Institute
Des Plaines, IL

PROJECT DURATION

18 Months

COST SHARING

DOE	\$368,000
Gas Technology Institute:	\$258,000

STRATEGIC CENTER FOR NATURAL GAS WEBSITE

www.netl.doe.gov/scng



CAPACITIVE TOMOGRAPHY FOR THE LOCATION OF PLASTIC PIPE

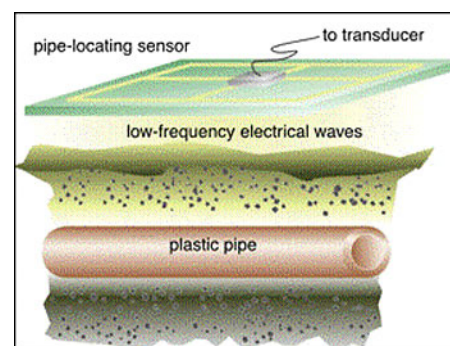
Background

The natural-gas utility industry has great interest in subsurface imaging of plastic, ceramic, and metallic objects because of the potential benefits in cost, reliability, and safety, that can be realized by avoiding impacts with the existing infrastructure and reducing inappropriate excavations. Ground-penetrating radar (GPR) has been applied to this area with limited success; the high frequencies necessary for good image resolution require high-cost associated electronics.

By contrast, the capacitive-tomography sensor uses low frequencies with a multiple-element antenna to obtain better resolution. This significantly lowers sensor cost, while improving depth of penetration. To meet industry need, the Gas Technology Institute (GTI) will develop a compact and inexpensive capacitive-tomography imaging sensor that takes the form of a flat plate or flexible mat that can be placed on the ground to image objects embedded in the soil.

Description

This project will develop a thin-film capacitive-tomography imaging sensor to locate buried plastic pipe. Several existing capacitive sensing techniques will be combined to quickly produce a demonstrable prototype—a sensor that can be laid on the ground to obtain a “snapshot” of the volume immediately beneath it. The sensor itself is a flat array of electrodes that can be inexpensively fabricated using printed circuit board techniques. The image is formed by measuring the impedance between adjacent electrodes at multiple frequencies. Image resolution is proportional to the number, and spacing, of the electrodes in the array. The sensor will also be applied to the surface of a backhoe to demonstrate its use on digging and boring tools for obstacle detection.



CAPACITIVE TOMOGRAPHY FOR THE LOCATION OF PLASTIC PIPE

CUSTOMER SERVICE

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Benefits

This project will improve the economics of natural gas pipeline infrastructure expansion through the introduction of new technology. A compact, versatile, low-cost sensor that can image objects through soil can be utilized in any operation that involves excavation. Having an accurate subsurface image of an area will avoid less costly keyhole excavations and will greatly improve the reliability and safety of natural-gas pipeline construction practices.

Goal

The goal of this project is to help modernize the Nation's natural gas delivery system. It responds to the Secretary of Energy's message of May 2001: "By 2020, Americans will be consuming 50 percent more natural gas than today. We will need newer, cleaner, and safer pipes to move these larger quantities of natural gas." The project furthers the Natural Gas Infrastructure Reliability Program goal: to foster the technologies needed to ensure the integrity, operational reliability, and efficiency of the Nation's natural gas infrastructure as it adapts to rapidly changing natural gas markets.